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AUTHOR Douglass, Donald D.
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ABSTRACT

Ways in which colleges can conserve energy are discussed. Reduction in the use of heat and light can be accomplished by taking several steps, such as reducing the amount of fresh air introduced into heating systems, turning off ventilating fans at night, cutting temperatures back during vacation periods and breaks, lowering the temperature of the hot water in the buildings, installing water flow restricters, decreasing both interior and exterior lighting, and rescheduling classes so that buildings are not heated for a few students. York College's program to conserve energy is described. (DB)

Middle Atlantic States Two-Year College Conference

June 13 & 14, 1974

"The College and the Energy Crisis"

by
Dr. Donald D. Douglass

Since the announcement of this topic, the Energy Crisis has more or less faded in the minds of some educators. To me it is as immediate as in the Fall of 1973. Many campus administrators are now making provisions for just such energy emergencies for the reduction of energy consumption and the making of permanent shifts in their educational calendar. Many presidents are now confident that the breaking from traditional long established practices do not necessarily compromise the quality of education.

If the energy crunch has not already affected every college and university in the country, it is not likely that they can continue for an extended period of time under this umbrella of protection. The long-term crisis will take its toll in all institutions, but in different ways. Those in the warmer climates may not find themselves unduly short of fuel, but will be directly affected by the high cost of gasoline, the growing shortage of gasoline and cutbacks in their electrical power and natural gas interruption. One benefit higher education will receive from the energy crisis will be the continued pressure to produce less wasteful designs and operation of buildings. The tendency has been for architects to design low initial cost building and ignore the long-term operating economies.

John Baird, Coordinator of Energy Policy for the U.S. Office of Education, suggests:

1. a. We can now absorb heat generated by people, lights, computers. The mechanical equipment can make this heat available to the rooms where it is needed.

b. Heat can now be extracted from the air which we exhaust from our buildings and the heat recirculated.

c. Heat recovery systems, though best incorporated in a new construction, can be installed in older buildings at somewhat higher costs.

2. Lower light levels. We have now realised that most areas can use as much as 50 percent less lighting (such areas as hallways, waiting rooms, general non-reading lounge areas). These areas can receive as much as a one-half reduction in lighting without loss of vision.

Heat and light are the two areas where colleges can give their greatest attention. Several measures may be taken to reduce heating costs. We can reduce the amount of cool fresh air which we introduce into our heating system and/or reduce the number of hours in which fresh air is admitted. Thus, during those periods when there is a small occupancy of the building, the air may recirculate throughout the building without the introduction of additional air. We may turn off ventilating fans at night, or as soon as the building comes to a low occupancy level. Experience has shown that the building will actually hold itself at a higher room temperature during the night hours without the circulating fans in operation. The cutting of such fans is especially effective in dormitories, classrooms, libraries and administration buildings. Another effective measure in the conservation of heat is a stringent cutback of temperatures during vacation periods and mid-winter breaks. Many of our buildings where we have an extended period of unoccupancy can be cut to as low as 40 degrees without damage to the building or its contents. The superintendent of buildings and grounds should be instructed to survey all buildings to determine the minimal level of temperature, which must be maintained in a building in order for it not to cause damage to the building or its contents. Princeton University recommended, as a result of their study: a) The residence halls could be maintained at 60 degrees between midnight and 6 a.m.,

b) Offices could be maintained at 60 degrees from 5 p.m. to 7 a.m. and on weekends, c) Academic buildings can have their temperatures lowered from 5 p.m. to 7:30 a.m., or if there is an evening session program, the temperature can be lowered one-half hour before the close of evening classes and reinstated at 7:30 a.m., and d) The library may be placed on a reduced heat one hour before closing to one hour before opening.

The lengthening of the mid-winter vacation has proven an effective way to save fuel. It is necessary, however, to watch that the vacation does not extend beyond one month or extend the spring semester. Either of these measures may affect the eligibility and the payments made to the veteran. It is also helpful to lower the temperature of the hot water, especially in the dormitories and gymnasium showers and washrooms. I will return to this matter at a later point in my talk. You can still receive adequate hot water and yet not use excessive temperatures. A second approach to saving water and heat is to install water flow restricters in the showers and automatic shut-off handles in the washrooms and on drinking fountains. Many students will spend an excessive amount of time in a shower leaving the shower running at its full force. The restricter will limit the flow of water to an adequace amount and yet not decrease the efficiency of the shower.

A summertime saver is to establish as a rule of thumb for air conditioners that the thermostat be set at 70 degrees or 10 degrees cooler than that recorded on the outside of the building, which ever temperature may be higher at the time.

In addition to a savings in heat, considerable savings may be realized through a decrease in lighting in both interior and exterior lighting. On interior lighting it has been found that by removing one-half of the florescent tubes in hallways, non-reading lounges and similar areas considerable savings can be experienced in the consumption of electrical power. The same approach may be used on exterior lighting. After a reasonable hour at night, every other light on driveways, walkways and in parking lots may be extinguished. Lights in certain areas of the parking lots may be extinguished completely after 10:30 or 11 p.m. in the evening. Paradoxically,

the energy crunch has brought a financial saving and a more efficient use of our college facilities. The savings has not always been as fully realized as one would have anticipated because of the sudden increase in costs passed on to the consumer by the utility companies.

An ever present problem is that created by the 'brown out'. This is a reduction in the normal voltage level of in-coming service. The building manager should have on record and be completely versant with the rating voltage of all of his equipment and at least the under-voltage the equipment will tolerate without damage. This will include lighting, cooling, elevators and similar types of electrical equipment. If your area experiences frequent periods of under-voltage it is recommended that you install a recording voltmeter on the incoming service which will make it possible for you to know the exact service your buildings are receiving. An automatic system with remote start-stop capacity will also prevent mechanical damage during severe 'brown outs'. The effect of a voltage reduction will vary from one piece of equipment to another. In lighting: The output of the incandescent bulb will have a 30 percent reduction in light for a 10 percent reduction in voltage. No damage will result to the lamp, in fact, it will actually increase the life of the bulb.

The florescent lamp is somewhat different. The 10 percent reduction in voltage will result in a 15 percent decrease in output. You can expect, however, a decrease in the life of the lamp and even possible damage to the starter itself. The effect of a voltage reduction on a motor will vary in direct relation to the extent and degree of reduction. Reductions in excess of 10 percent will cause some motors to stall out. A reduction in voltage of 15-20 percent will cause an increase in internally generated heat and eventually winding failure can be expected. Such equipment as computers, transistors and similar kinds of electronic machinery will often malfunction at voltages below a 10 percent of the rating.

It is important that someone on your campus be delegated the responsibility of

supervising electronic units on the campus.

In addition to a direct savings of energy and fuel by the college, other general savings of fuel may be accomplished through what seems to be the obvious. You may form student, faculty and staff car pools. We accomplished this through our computer. The computer prepared for us lists of those students living in a specific area only a few blocks apart. The effectiveness of our car pool arrangement, however, did not materialize as we had desired. A preferential parking area was set aside and those students forming car pools were given special stickers and granted privileged parking. We found, however, that a very limited number of students took advantage of such car pools. This lack of enthusiasm was due in part to the great variance in student class schedules thus making it inconvenient for the student to remain on campus during long periods of time while waiting for a fellow student to complete a class or complete his studies at the library. If the gasoline crunch had continued for a longer peiod of time, I feel that the car pool concept would have caught on and become more and more effective.

In the decade ahead several new sources of energy will be developed. We can anticipate experimentation in more effective methods of utilizing present fuel and fuel systems.

Adelphi University reported a three-year study on the use of a new ultrasonic fuel reactor that with the use of 25 percent water and 75 percent oil in its heating system it was able to provide a cleaner fuel and a savings of $870 per week in fuel bills. Other methods are being tested and other forms of heat are being utilized. For instance, experiments are now being performed on the capturing of heat from the sun, the utilization of manure and the recapturing of potential heat from garbage power. One thing is certain, we will seek and find new sources of power.

Another area of concern for our colleges has been a growing shortage of paper. Two years ago I heard a forecast which stated that we could anticipate a sharp re-

duction in the availability of paper. On that occasion I was speaking at the annual meeting of the National Association of the Manufacturers of Corrigated Boxes. At their annual meeting they were painting a picture of doom with little hope in sight over the next 5 - 10 years. Unfortunately, the hardest hit area has been in the lighter weight papers. We are now finding it necessary to buy the more expensive paper and thus escalating our total college costs. Many of us have found it possible to reuse scrap paper by cutting it for notepaper and similar usage. We also can purchase recycled paper. Through these and other methods we can experience a saving or at least hold the line in costs in this area of growing importance.

Before I open the topic for general discussion, and I would like to have each of you express what has been happening on your campus in the way of energy conservation, I will review briefly the policies York College has established in view of the Energy Crisis. Each college must establish its own guidelinges in keeping with its type, source and supply of fuel and energy. At York College we designated one office, the Assistant to the President, as the Director for the Energy Crisis. York College's source of heat is interruptible gas with oil standby. Our problem has been complicated by the relatively mild winter we experienced in 1972-73. Because of the history of minimal interruptions, York College found itself without a fuel oil allocation for the academic year 1973-74. These are factors which one must consider in developing its own guidelines.

Our guidelines were in three separate parts: the first, immediate action; the second, emergency measures should it be necessary for the college to turn from a natural gas to an oil as its source of heat and energy; and the third, the steps the college must take for a temporary shutdown.

The immediate measures included: A reduction in the temperatures in offices, classrooms, lavatories, library, lounges, gymnasium, dining hall and residence halls. After closing each building for the evening the circulating fans were turned off.

On weekends and holidays temperatures were drastically reduced but remaining at a safe level. One-half of the florescent light tubes were removed in hallways, lounges and other non-reading areas. For instance, in my office each light contained four florescent tubes. With the exception of the light directly above my desk, two tubes were removed from each light. This policy was followed throughout the college. The gymnasium light control switches were color-coded--coded according to the type of activity or room usage which might take place within the gymnasium. Thus, when a coach or instructor walked into the gym, he could immediately switch on the necessary lights depending upon the function to which he was putting the room. Half of the campus lights along driveways and walkways were turned off by manual switches at the close of an evening's function. All lights were extinguished in certain areas of the campus at 10:30 p.m. and in parking areas.

The swimming pool is undoubtedly the greatest consumer of energy. We have reduced the water temperature to 78 degrees and the air in the pool area to 83 degrees. These temperatures were determined by national guidelines.

We found that on Friday evenings we had a minimal number of evening classes. We thus rearranged these classes to other evenings of the week and discontinued Friday evening classes altogether. This resulted in a further reduction in both heat and light.

Since the College is on interruptible gas service an adjustment in semester breaks or vacation periods would not result in any direct value in our total fuel problem. We have in the past maintained our offices around the holidays at a minimal staff. For instance, the day before a holiday and the day after a holiday one-half of the staff would be on leave. We decided that this year, by closing the College on one of these days and maintaining full operation on the other day we could experience a reduction in both heat and light.

Our second plan of action called for emergency measures should we suddenly face the problem of converting from gas to oil heat for an extended period of time. In sur-

veying our oil supply, our maximum tank capacity would not permit the college to operate at full capacity for in excess of one week to 10 days. We, therefore, found it necessary to establish a building priority plan placing certain buildings on a minimal heat and permitting the remaining buildings to operate at full capacity. Even this policy would not permit us to continue our teaching program for in excess of two to three weeks.

We found ourselves at a decided disadvantage with the fuel supply of natural interruptible gas and a limited tank supply of oil. It was necessary for us to keep in mind that should it be necessary for us to discontinue the educational program that we must maintain our buildings at a minimal heat level until the crisis were to subside.

The third and final plan of action was an arrangement for a temporary closing of classes. The details of such a closing could not be preplanned. Its timing and duration was dependent solely upon weather conditions. We, therefore, asked our Deans to prepare alternative schedules which could be adjusted for the varying set of circumstances. Should the crisis occur during the early weeks of January when the College was in recess, we would simply defer the opening of the second semester and eliminate a later Spring vacation. Were it to occur after the second semester had begun, we would then find it necessary to adjust according to the dates and timing of the crisis.

I realize that I have not answered all the questions regarding conservation of energy. Perhaps now we can take a few minutes to share with each other what our institutions have accomplished and thus mutually profit by each others' experience.